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REMARKS/ARGUMENTS

Applicants thank the Examiner for the interview and further for her assistance during the interview. The amendments and remarks presented herein are believed to address the concerns voiced by the Examiner and further overcome the prior art of record. The remarks and amendments are fully supported by the application as originally filed. No new matter has been entered.

Status of Claims

Claims 1-15 are pending in the application. Claims 14 and 15 were presented as new claims in the Response filed June 2, 2008.

Claim Rejections 35 USC § 103

Claims 1-13 currently stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,571,196 to Kosuge et al. in view of U.S. Patent No. 5,974,169 to Bachelder et al. and, further, in view of U.S. Patent No. 6,064,759 to Buckley et al.

Applicant respectfully traverses.

As discussed during the interview, even when combined the references do not teach all the claim limitations. To establish a prima facie case of obviousness, the prior art reference or references when combined must teach or suggest all the claimed limitations. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). See MPEP § 2143.

With reference to Claim 1, Applicant respectfully urges that even when combined Kosuge '196 (US 6,571,196), Bachelder '169 (US 5,974,169) and Buckley '759 (US 6,064, 759) do not

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disclose or suggest, for example, using a single image of an object to generate three dimensional data representing at least part of the object, as called for in the claims.

In contrast, Bachelder '169 is directed to a technology to determine the position, size, centre of mass, boundary and orientation of 2D shapes in a 2D image. Bachelder does not detail how real world 3D object measurements are calculated from the 2D image shapes.

Kosuge '196 discloses an inspection system in which the object to be inspected is movable with respect to the camera by means of an XY stage and an XY driver (see Figure 2 and column 4, lines 14 to 18). Kosuge '196 is directed to determining the contour of an object in two dimensions (see Abstract, column 1, lines 55 to 64 and column 3, lines 33 to 53).

While Buckley '759 describes a technology to measure the 3D shape of an object, Buckley's system does not use a single image to generate three dimensional data representing at least part of an object, as called for in the claims—in contrast, Buckley '759 describes moving the object in front of the camera and shining a structured light, specifically laser light, onto the object and using multiple images and triangulation (column 5, lines 65 to column 6 line 5) to determine the surface in 3D.

Nor do any of the references alone or in combination disclose that the image edge data components projected onto an object plane to produce respective object edged data component.

Therefore, even when combined the references do not teach or suggest the claimed combination. Accordingly, Applicant respectfully submits that Claim 1 is patentably distinguishable over Kosuge, Bachelder, and Buckley.

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With regard to Claim 2, Claim 2 depends from amended Claim 1 and thus incorporates the same limitations of amended Claim 1 and is therefore patentably distinguishable over Kosuge, Bachelder, and Buckley for at least the reasons set forth above.

In addition, Claim 2 calls for when an edge profile of the object taken in a plane generally perpendicular to the object plane is generally perpendicular to the object plane, or is undercut, the object edge data component is adjusted by subtracting an amount substantially equal to the ratio multiplied by the relative distance between the object edge data component and the position of the camera's focal point in the object plane. Hence, Claim 2 defines how the object edge data component is adjusted in situations where an edge profile of the object is perpendicular to the object plane or is undercut. As such, it relates to how the captured image data, after it has been projected into the object plane, is adjusted to compensate for parallax error.

Even when combined, Kosuge, Bachelder or Buckley do not disclose for example, adjusting the object edge data component by subtracting an amount substantially equal to the ratio multiplied by the relative distance between the object edge data component and the position of the camera's focal point in the object plane.

As described in relation to Claim 1 in the Response filed June 2, 2008, moving the object with respect to the field of view of the camera (as suggested by the Examiner) does not achieve this adjustment, since the adjustment called for in the claim must be performed on the data after the image has been captured. The movement of the object described by Kosuge at column 8, lines 62 to 64 occurs prior to an image being captured and so is not relevant to the issue of how to adjust the captured image data.

Moreover, as noted above none of Kosuge, Bachelder or Buckley are concerned with creating three dimensional object data from a single image, hence the problem of compensating for parallax error does not arise and none of these documents disclose, or have the need of, the

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features of Claim 2. Accordingly, Applicant respectfully submits that Claim 2 is patentably distinguishable over Kosuge, Bachelder, and Buckley.

With regard to Claims 3 and 4, Claims 3 and 4 depend from amended Claim 1 and thus each incorporate the limitations of amended Claim 1 and are therefore patentably distinguishable over Kosuge, Bachelder, and Buckley for at least the reasons set forth above.

Regarding Claim 5, Claim 5 calls for the system of the invention to determine whether or not an object edge data component relates to an edge of a side of the object facing the work surface or of a side of the object facing the camera.

The Examiner contends that this technique is disclosed by Bachelder. The applicant respectfully disagrees. Firstly, as explained above, the techniques taught by Bachelder are all performed on the two dimensional image data and not on the object data as required by Claim 5. Secondly, Bachelder is not concerned with creating three dimensional object data from the two dimensional captured image data and does not disclose determining whether or not an object edge data component relates to a side facing the work surface or a side facing the camera.

The specific passage of Bachelder (column 9, lines 51 to 63 and 48, 50) identified by the Examiner relates specifically to fitting lines 155A to 155D (Figure 5E) to two dimensional boundary points 150 (Figure 5D) that have been determined as edge points. Boundary points that are outside the bounding boxes as shown in Figures 5B and 5C are discarded. It is emphasised that this is a two dimensional analysis of two dimensional data in order to perform line fitting and so to model the object. Therefore, Bachelder does not disclose or suggest determining whether or not the edge of the object is an edge of the side facing the camera or an edge of the side facing the work surface.

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Moreover, Bachelder does not disclose any of the following other features of Claim 5: calculating a respective first parameter relating to a notional reference line extending from the object edged data component, calculating a second parameter relating to a notional line extending between the object data component and a reference point in the object plane, and comparing the difference between said first parameter and said second parameter against a threshold value.

It is respectfully submitted therefore that the teaching of Bachelder either on its own or in combination with Kosuge and/ or Buckley do not disclose or suggest the combination called for in Claim 5.

Accordingly, Applicant respectfully submits that Claim 5 is patentably distinguishable over Kosuge, Bachelder, and Buckley.

Regarding Claim 6, the features of this claim are dependent on Claim 5. Claim 6 is therefore patentably distinguishable over Kosuge, Bachelder, and Buckley for at least the reasons set forth above.

Further, with regard to the passage of Bachelder identified by the Examiner (columns 8, lines 32 to 46 in Figure 3E) in relation to Claim 6, this states clearly that Bachelder decides that a boundary point in the two dimensional image data corresponds to a top edge of the object simply by deciding whether or not it falls into a particular bounding box. This does not involve the notional reference lines, first and second parameters, and threshold values comparisons of Claim 5, or the more specific definition of the first parameter given in Claim 6.

Claim 7 depends from Claim 1, and Claim 8 depends from amended Claim 5 and ultimately from amended Claim 1; Claims 7 and 8 are therefore patentably distinguishable over Kosuge, Bachelder, and Buckley for at least the reasons set forth above.

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With reference to Claims 9 and 10, Claims 9 and 10 depend from amended Claim 1 and are therefore patentably distinguishable over Kosuge, Bachelder, and Buckley for at least the reasons set forth above.

With regard to Claim 11, Claim 11 has been amended to call for the apparatus to be arranged to receive the image data components from the camera and to generate three dimensional data representing at least part of the object using the image data components without requiring the application of structured light to the object or the combination of data components from multiple images by triangulation. As noted above, the references when combined teach the use of triangulation in order to generate a three dimensional image. Applicant respectfully urges that none of the references alone or in combination teach or suggest the claimed combination and in fact teach away from the claimed combination. Accordingly, Applicant respectfully urges that Claim 11 is patentably distinguishable over Kosuge, Bachelder, and Buckley.

With regard to Claim 12, Claim 12 has been amended similar to Claim 1 and calls for generating three dimensional data of at least part of an object using a single image of the object. Claim 12 and its dependent claim, namely Claim 13, are therefore similarly patentably distinguishable over Kosuge, Bachelder, and Buckley for at least the reasons set forth above in reference to Claim 1.

Claims 14 and 15 depend from amended Claim 1 and are therefore patentably distinguishable over Kosuge, Bachelder, and Buckley for at least the reasons set forth above in reference to Claim 1.

In light of the above amendments and remarks, Applicant respectfully requests reconsideration of the present application and respectfully solicits a Notice of Allowance of all claims. It is respectfully submitted that the application is in order for allowance.

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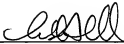
Should the Examiner have any questions or suggestions, she is invited to contact the undersigned at (616) 975-5506 or at collins@vglb.com.

Respectfully submitted,

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